

REMARKS

Specification

NO → The Office requested clarification regarding a disclosed alkali metal description where examples included non alkali metals. The Applicants have amended the specification to remove this unclear terminology. The amendments to the specification do not introduce new matter as they are merely corrections of generic descriptions of examples given in the specification of the application as filed.

Claims objections

✓ The Office objected to informalities in Claims 2, 6 and 8. Corrections suggested by the Office have been incorporated into the claims. The Applicants respectfully submit that these amendments introduce no new matter as they merely more correctly describe statements in the claims as filed.

Claims Rejected Under 35 U.S.C. § 112

✓ The Office rejected Claims 1-8 under 35 U.S.C. § 112 first paragraph, because the specification while being enabling for a metal oxide containing Potassium (K) or sodium (Na), does not reasonably provide enablement for a metal oxide containing Mg, Al, Co, Ca, Si, Ti, or Sr. The Claims have been amended to read "metal or nonmetal" rather than "alkali metal" as in the specification as filed. These amendments introduce no new matter, because they are merely more correct generic descriptions of examples that were described in the application as filed.

✓ The Office rejected Claims 2, 4, 6 and 7 under 35 U.S.C. § 112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The term metal component was used to describe Si. The term "metal component" has been amended to distinguish between

metal and nonmetal. These amendments introduce no new matter, because they are merely more correct generic descriptions of examples that were described in the application as filed.

Claims Rejected Under 35 U.S.C. § 102

The Office rejected Claims 1, 5 and 8 under 35 U.S.C. § 102(b) as being anticipated by Wang, U.S. Patent Number 5,783,328, hereinafter "Wang". The Office states that "Wang teaches a method of treating a lithium manganese oxide spinel. The spinel is first coated with an alkali metal hydroxide (metallic alkoxide solution), preferably lithium, sodium or potassium hydroxide, and then heated." The Applicants respectfully disagree.

In order to anticipate a claim, the relied upon reference must disclose every limitation of the claim. Amended Claim 1 recites a metal oxide or non-metallic oxide coated on the active materials component, the metal oxide being selected from the group consisting of magnesium, aluminum, cobalt, potassium, sodium, calcium, titanium and strontium and the non-metallic oxide comprising silicon.

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The Office states Wang and this invention both heat the metal hydroxide coating at the same temperature for the same timed duration. Neither amended independent Claim 1 or Claim 1 as filed, has a metal hydroxide coating, therefore the fact that amended Claim 1 has a metallic oxide or nonmetallic oxide coating over the powder is not inherent from Wang.

Independent Claim 5 recites "coating the powder with a metallic alkoxide solution or a non-metallic alkoxide solution to make a alkoxide-coated powder. The Office seems to state that an alkali metal hydroxide is the same thing as a metallic alkoxide solution. The Applicants respectfully disagree. A metallic alkoxide is a compound in which a carbon group is attached to an oxide group which is attached to a

metal group. Similarly, a non-metallic alkoxide is a carbon group attached to an oxide group attached to a non-metal. Thus, a metallic alkoxide solution is not the same as an alkaline metal hydroxide which, as the Office states, is just a family-one metal attached to a hydroxide. The absence of the alkoxide solution in Wang is fatal to the asserted rejection. Claim 8 depends on Claim 5 and, therefore, contains all the limitations thereof. In light of this, the Applicants respectfully submit that Claim 8 is not anticipated by Wang for at least the same reasons as Claim 5. Amended Claims 1, 5 and 8 are not anticipated by Wang, therefore the Applicants respectfully request the Office withdraw its rejection of Claims 1, 5 and 8 under 35 U.S.C. § 102(b) as being anticipated by Wang.

The Office rejected Claims 1 and 4 under 35 U.S.C. § 102(e) as being anticipated by Goda et al., U.S. Patent No. 6,004,695 hereinafter "Goda". The Applicants respectfully submit that nowhere does Goda teach the metal or non-metal used in the present invention. Amended independent Claim 1 includes the limitation "a metallic oxide or non-metallic oxide coated on the active material component, the metallic oxide being selected from the group consisting of magnesium, aluminum, cobalt, potassium, sodium, calcium, titanium and strontium and the non-metallic oxide comprising silicon." The absence of the metal or non-metal in Goda is fatal to the asserted rejection, therefore the Applicants respectfully request the Office withdraw its rejection of Claims 1 and 4 under 35 U.S.C. § 102(e) as being anticipated by Goda.

SiO₂ in reference

Claims rejected under 35 U.S.C. § 103.

The Office rejects Claims 3, 4 and 7 under 35 U.S.C. § 103(a) as being non-obvious over Wang. Amended Claims 3 and 4 are dependent on independent Claim 1. Independent Claim 1 is not obvious over Wang in light of the arguments cited above. Therefore, the Applicants respectfully submit that the dependent Claims 3 and 4 which

contain all of the limitations of independent Claim 1 are non obvious over Wang as well. Amended Claim 7 is dependent on amended Claim 5. Amended independent Claim 5 is not obvious over Wang in light of the arguments cited above. Therefore, amended Claim 7 which depends on amended Claim 5 is not obvious over Wang for at least the same reasons. For these reasons, the Applicants respectfully submit that amended Claims 3, 4 and 7 are not obvious in light of Wang and the Applicants respectfully request the Office withdraw its rejection to Claims 3, 4 and 7 under 35 U.S.C. § 103(a) as being obvious over Wang.

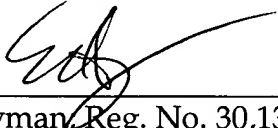
CONCLUSION

In view of the foregoing, it is believed that all claims now pending are in proper form and are neither obvious nor anticipated by the relied upon art of record and are in condition for allowance. A Notice of Allowance is earnestly solicited at the earliest possible date. If there are any fees due in connection with the filing of this response, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

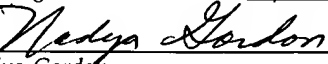
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CERTIFICATE OF MAILING:

I hereby certify that this correspondence is being deposited as First Class Mail with the United States Postal Service in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on September 10, 2001.

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IN THE SPECIFICATION

The paragraph on page 4, line 4, beginning with "Thereafter, the powder is coated with" has been amended as follows:

an alkoxide of one of the foregoing

Thereafter, the powder is coated with a metallic or non-metallic alkoxide solution. The ~~metallic~~ alkoxide solution is formed by the reaction of an alcohol with an ~~alkali metal~~ metal or non-metal being 1 to 50 weight percent of the alcohol. The ~~alkali metal~~ metal or non-metal may be preferably selected from Mg, Al, Co, K, Na, Ca, Si, Ti or Sr. More preferably, the ~~alkali metal~~ metal or non-metal is selected from Ai, Mg, Ti or Al. The alcohol is preferably selected from methanol or ethanol. When the ~~alkali metal~~ metal or non-metal is less than 1 weight percent of the alcohol, the coating effect of the metallic alkoxide solution onto the powder is not induced. In contrast, when the ~~alkali metal~~ metal or non-metal is more than 50 weight percent of the alcohol, the coating layer of the metallic alkoxide solution becomes undesirably thick. A sputtering technique, a chemical vapor deposition (CVD) technique, a dip coating technique and other general-purpose coating techniques may be employed for the coating use. Among the techniques, the dip coating technique may be preferably used for coating the metallic or non-metallic alkoxide solution onto the powder.

The paragraph on page 4, line 18, beginning with "The alkoxide-coated powder is" has been amended as follows:

The alkoxide-coated powder is then dried at 120°C for about 5 hours in an oven. The drying step is to uniformly distribute lithium salts in the powder. Thereafter, the dried powder is heat-treated at temperatures ranged from 200 to 1000°C for 1 to 20 hours under an oxidation atmosphere where dry air or oxygen is blowing. When the heat-treating temperature is lower than 200°C, the metallic or non-metallic alkoxide

solution coated on the powder is not crystallized so that it prohibits free movement of lithium ions in the active material. It is preferable that the heat-treating step is performed at temperatures ranged from 300 to 900°C for 1 to 10 hours. This heat-treating operation makes the metallic or non-metallic alkoxide to be changed into a metallic oxide. In this way, a metallic or non-metallic oxide-coated active material is prepared.

The paragraph on page 5, line 6, beginning with "The metallic oxide formed on the surface" has been amended as follows:

The metallic or non-metallic oxide formed on the surface of the power may be derived from the single metallic or non-metallic alkoxide source or the composite sources of manganese of lithiated transition metal compound and metallic or non-metallic alkoxide. The thickness of the metallic oxide layer reaches up to 1 to 100nm and the quantity of metal content is ranged from 1.0 to 10 weight percent of the metallic oxide.

IN THE CLAIMS

The claims are amended as follows:

1. (Amended) A positive active material for rechargeable lithium batteries, the positive active material comprising:

an active material component processed from a manganese-based compound, the manganese-based compound being selected from the group consisting of Li_xMnO_2 , Li_xMnF_2 , Li_xMnS_2 , $\text{Li}_x\text{MnO}_{2-z}\text{F}_z$, $\text{Li}_x\text{MnO}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{F}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{S}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{F}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_2\text{O}_4$, $\text{Li}_x\text{Mn}_2\text{F}_4$, $\text{Li}_x\text{Mn}_2\text{S}_4$, $\text{Li}_x\text{MnO}_{4-z}\text{F}_z$, $\text{Li}_x\text{MnO}_{4-z}\text{S}_z$, $\text{Li}_x\text{Mn}_2\text{M}_y\text{O}_4$, $\text{Li}_x\text{Mn}_2\text{M}_y\text{F}_4$, $\text{Li}_x\text{Mn}_2\text{M}_y\text{S}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{F}_z$, and $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{S}_z$,

where $0 < x < 1.5$, $0.05 \leq y \leq 0.3$, $z \leq 1.0$ and M is selected from the group consisting of Al, Co, Cr, Mg, Fe and La; and

112 a metallic oxide or non-metallic oxide coated on the active material component, the metallic oxide being selected from the group consisting of Mg, Al, Co, K, Na, Ca, Ti and Sr, and the non-metallic oxide comprising Si.

2. (Amended) The positive active material of claim 1 wherein the metallic oxide has a metal selected from the group consisting of Si, Mg, Ti and Al, and the non-metallic oxide has a non-metal comprising Si.

3. (Amended) The positive active material of claim 1 wherein the oxide has a thickness ~~ranged from~~ range of 1–1000nm.

9 4. (Amended) The positive active material of claim 1 wherein the ~~metallic oxide has a~~ quantity of metal or non-metal content is a range of 1 to 10 weight percent of the ~~metal component~~ oxide.

5. (Amended) A method of preparing a positive active material for rechargeable lithium batteries, the method comprising the steps of:

obtaining a powder from a source material, the source material being selected from the group consisting of Li_xMnO_2 , Li_xMnF_2 , Li_xMnS_2 , $\text{Li}_x\text{MnO}_{2-z}\text{F}_z$, $\text{Li}_x\text{MnO}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{F}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{S}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{F}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_2\text{O}_4$, $\text{Li}_x\text{Mn}_2\text{F}_4$, $\text{Li}_x\text{Mn}_2\text{S}_4$, $\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{F}_z$, $\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{S}_z$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{F}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{S}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{F}_z$, and $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{S}_z$, where $0 < x < 1.5$, $0.05 \leq y \leq 0.3$, $z \leq 1.0$ and M is selected from the group consisting of Al, Co, Cr, Mg, Fe and La; and

coating the powder with a metallic alkoxide solution or a non-metallic alkoxide solution to make an alkoxide-coated powder, the metallic alkoxide solution being

selected from the group consisting of Mg-Alkoxide, Al-alkoxide, Co-alkoxide, K-alkoxide, Na-alkoxide, Ca-alkoxide, Ti-alkoxide and Sr-alkoxide, and the non-metallic alkoxide solution comprising Si-alkoxide; and

heat-treating the ~~metallie~~-alkoxide-coated powder such that the ~~metallie~~-alkoxide-coated powder is changed into an ~~metallie~~-oxide-coated powder.

6. (Amended) The method of claim 5 wherein the ~~metallie~~-alkoxide solution is selected from the group consisting of Si-alkoxide, ~~Mg-alkoxide~~, Mg-alkoxide, Ti-alkoxide and Al-alkoxide.

112 7. (Amended) The method of claim 5 wherein the ~~metallie~~-alkoxide solution contains ~~a~~ 1 to 50 weight percent of the metal or the non-metal~~component~~.

8. (Amended) The method of claim 5 wherein the heat-treating step is performed at ~~temperatures ranged from~~ temperature range of 200 to 1000°C for 1 to 20 hours.